CMGC Process Report – Phase I

For

Syracuse Road; 1000 West to 2000 West
F-0108(24)4; Syracuse, Utah

Prepared by

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For

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Of

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Table of Contents

Purpose

In accordance with the Memorandum of Understanding SEP 14 (MOU) for Alternative Contracting Process, the CMGC Phase I Report is to provide "a detailed comparison of the UDOT prepared ICE and the negotiated price for construction as well discussion of each of the evaluation criteria". Evaluation criteria as outlined in the MOU is as follows:

A. Design and Constructability
B. Innovation
C. Project Schedule
D. Risk
E. Learning Opportunities
F. Environmental Stewardship
G. Benefit to the Public

In accordance with the Project Justification Guidelines outlined in the MOU, "All 7 criteria do NOT have to be considered". This report will only focus on those items that are outlined in the Justification Report approved on April 10, 2008.

Furthermore, the Utah Department of Transportation (UDOT) has outlined additional information that is required in this report for internal evaluation. This information includes a comparison of schedule, as well as performance and observations of those involved in the successes and difficulties associated with the CMGC process.

This report focuses on the implementation of the CMGC process to the Syracuse Road; 1000 West to 2000 West; Syracuse project number F-0108(24)4, located in UDOT Region One area. The justification report lists this project as an "urban reconstruction" project.

Project Overview

This project, located in Syracuse, Utah, involves widening the existing two-lane roadway to five lanes, with two lanes in each direction, a center turn lane, and shoulders with bike lanes. The project includes new pavement, curb and gutter, sidewalks, storm drain, lighting, signals, utility relocations, and landscaping. The project also includes right-of-way acquisition, removal of houses, and new irrigation, culinary, and secondary water lines. Figure 1 shows early construction on the project.

Figure 1 Early Construction

Table 1 shows a summary of the project.

TABLE 1 – Project Overview Information Summary

Project Type:	Roadway Widening
Project Number:	F-0108(24)4
PIN:	4896
Funding:	Federal and State
Justification Report Approval:	April 10, 2008
Preliminary Cost:	$35,000,000

Design costs

Table 2 shows a summary of the firms that provided preconstruction services and the fee associated with those services.

TABLE 2 – Design Services Summary

Firm	Service	Contract Amount
Horrocks Engineers	Preparation of Final Construction Plans	$972,491
Geneva Rock	Constructability reviews, suggestions for minimizing utility and traffic control impacts, assistance in preparing construction estimates, and assistance in determining construction schedule.	$128,415
PB Americas	Review of PS&E, constructability, and cost estimates	$54,940
Landon Group	Public involvement coordination and information management, including support during phase 1 of construction	$111,960
Stanton Constructability	Independent cost estimate (ICE)	$65,000
Total Design Services		$1,333,806

Of this total, $128,415 was paid to the contractor for their design services, approximately 9.6 percent of the design fee.

Construction Costs

UDOT contracted with Geneva Rock Company to provide construction services under the CMGC process for $12,032,465.45, which was $831,471.70 more than the Engineer's Estimate for the project, and $3,706,380.65 less than the ICE. In addition, UDOT contracted with Geneva Rock for preliminary construction services, including waterline installation and demolition of homes on right-of-way takes. This early contract was for $1,915,016.10, which was within $134,350 more than the Engineer's Estimate, and $2,091,135 less than the ICE. Approximately $500,000 of the construction costs are City betterments.

Project Goals

UDOT determined that success on this project required a balance of the following outcomes:

- A high level of safety for motorists, pedestrians, and workers;
- A high level of public satisfaction with the business and property owners, motorists, and other stakeholders;
- Adequate utility coordination to ensure project schedules are met and conflicts are minimized;

- Development of a traffic control and phasing plan that minimizes impacts to the traveling public and minimizes the duration of construction;
- Completion of the project within the project budget with a Guaranteed Maximum Price (GMP) at the beginning of construction.

Key project elements affecting the balance of these goals include the level of coordination with business and homeowners, impacts to motorists, utility relocations, right-of-way clearance, and overall constructability.

Price Component

To establish standard pricing comparisons, UDOT included in the RFP a Contractor Price Submittal (RFP-Appendix D) which identifies standardized services or supplies and set quantities. As part of the review of the procurement process (See Contractor Price Proposal below) these costs were compared. Items on the list included:

- Granular Borrow
- Geogrid Type 2
- Roadway Excavation
- 18 inch irrigation/storm drain
- 24 inch irrigation/storm drain
- 30 inch irrigation/storm drain
- Concrete Drainage Structure
- Asphalt Treated Base Course
- HMA- ¾ inch
- Concrete Curb and Gutter Type B1
- Concrete Driveway
- Pedestrian Access Ramp
- Concrete Sidewalk
- Bonded Wearing Course

Cost Model

The explanation of cost was broken down in the instructions for the RFP's Approach to Price Proposal (RFP-Appendix E). As part of the proposal, a breakdown of the unit price was required for each of the price component items listed in the RFP Appendix D. The breakdown included the following elements:

- Labor
- Equipment
- Material
- Trucking
- Other- a description was required
- Overhead
- Profit

Furthermore, the RFP Appendix D stated that the unit prices reported would be held throughout the project unless justification was expressly stated in the proposal. Justification was required for the following:

- Identify risks that would increase the unit price;
- Identify mitigations that would decrease the unit price;
- Identify amount of quantity change that would justify a change in unit price;
- Identify assumptions used to create unit cost;
- What will you do in the design process to help identify and minimize risk?

Applicability of the CMGC Process

In accordance with the original MOU between UDOT and the Federal Highway Administration (FHWA), each project selected for the CMGC contracting process must evaluate how the criteria for selection issues were impacted by the project. It is important to note that in accordance with the MOU, additional characteristics that make the project a good candidate for the CMGC process can be justified by UDOT. The justification report indicated that this project was justified by the following criteria outlined in the MOU: Design and Constructability, Project Schedule, Benefit to the Public, and Risk.

Design and Constructability

The biggest design change resulting from contractor involvement was in the pavement design. The original design showed hot-mix asphalt (HMA) pavement, which typically has a lower up-front cost than Portland cement concrete (PCC) pavement. However, under the current market conditions, the contractor estimated that the switch to PCC pavement would save approximately $750,000. Also, some of those savings were due to the contractor's expertise with PCC pavement, and a simplified pavement cross-section associated with the PCC pavement design. Based on the up-front and long-term cost savings of a 40-year design life instead of 20 years, UDOT decided to proceed with the PCC option (interview with N. Peterson, S. Albrecht). Figure 2 shows preparations for installation of the concrete pavement.

Figure 2 Rebar for Concrete Pavement

The contractor provided feedback and ideas regarding design and constructability in all aspects of the job, including pavement type, landscaping, roadway and utility profiles, park strip details, utility relocations, and lighting. One of the benefits of this feedback was that it enabled the design engineers to customize the design to match the methods used by the contractor.

The project team met together at least every other week throughout design to discuss design and constructability. In addition, the contractor sent emails with ideas and recommendations, and sent bi-weekly updates to the project team. Most of the contractor's recommendations were incorporated. The decision on whether or not to incorporate ideas was based on group discussion of the UDOT project manager, contractor, the lead design engineers, and other UDOT designers. If the group decided that a recommendation resulted in betterment to the project or resulted in cost savings, it was generally accepted. On large issues, such as switching the pavement type, the UDOT PM consulted with other UDOT engineers within the Region and at the Complex, such as the materials engineers, the district engineer, and the resident engineer.

The following is a list of some specific areas where contractor involvement in design resulted in improved design and constructability:

- Switching from HMA pavement to PCC pavement resulted in up front and life-cycle cost savings, and improved pavement quality.
- Easements and right-of-way takes were refined and minimized

- When deciding between two options that were equal from a design perspective, the contractor was able to provide realistic cost information to assist in decision making
- Phasing and constructability reviews allows for improved maintenance of traffic and ensure that at least one lane of traffic each way will remain open during construction.
- The team decided to use one single larger storm drain to reduce the number of conflicts with other utilities. However, the larger pipe affected the Fiber Optic Qwest line. The contractor met with Qwest and found that they are able to excavate enough fiber optic cable to place line over the new enlarged storm pipe.
- The depth of the storm drain was decreased, resulting in a lower cost and increased constructability.
- The storm drain system was moved a couple of feet to the south, which avoids conflicts with the culinary water line. This move could avoid up to 10 loops in the laterals to the water line.
- Improved coordination with the utilities through potholing and direct contact between the contractor and the utility companies has resulted in a design that better accommodates the utility.
- The contractor's experience with traffic control and construction phasing enabled them to adjust the phasing plans to make better use of the pavement available. The result was a cost savings by minimizing the use of temporary pavement.

Based on interviews with the project team, all parties agree that the design and constructability has been improved by contractor involvement through the CMGC process.

Innovative Process

The key benefit of the CMGC process is contractor involvement in the design. Contractors often bring a different perspective than the engineers, which can be useful in solving complex issues. This section focuses on how these innovations have improved this project.

Innovation Used

A variety of innovations were incorporated into this project as a result of contractor participation. The following is a list of notable innovations:

- All parties involved agreed that the use of concrete pavement was an innovation because concrete pavement would not have been seriously considered for this roadway otherwise.
- The use of fusible polyethylene pipes for water laterals instead of copper will allow for the contractor to be able to install the pipe under half the road at a time, rather than all

at once. This innovation ties in with the project phasing, simplifies construction, and lessens traffic impacts.

- The contractor took upon themselves the risk of early procurement of pavement dowels. However, after the dowels were procured, UDOT realized that the pavement thickness needed to be increased from nine to ten inches. According to the design standards, the pre-procured dowels were ¼ inch too narrow. UDOT and the contractor were able to develop a design that allowed for the use of the narrower dowels, and still provided an acceptable design. The contractor agreed to not charge extra for the increased pavement thickness. Both parties benefited from the innovation.
- The designer was willing and able to share their design CAD files with the contractor, which were used for the grading plans. This innovation decreased the amount of duplicated work.
- Lessening the depth of the storm drain system, and using a single, instead of dual trunk lines reduced the number of conflicts with the existing culinary water lines.
- UDOT and the Contractor were able to coordinate to obtain environmental clearances for a site near the project to discard excavated material. Without the use of this site, the Contractor would have had to transport material to a commercial site two hours away.

This list shows that the contractor made numerous innovative contributions that enhanced the project. Figure 3 shows some of the preliminary utility work, including a partially filled-in trench from the water lines.

Figure 3 Storm Drain Trench-Depth was Lessoned to Save Cost

Money Saved by Innovation

The following are estimates, provided by the contractor, of the cost savings that resulted from innovations:

- Switching to concrete pavement: $750,000
- Use of flexible poly pipe instead of copper: $125,000
- Use of the nearby dump site for excess fill: $240,000

There were also numerous innovations where the cost savings were more difficult to track, such as sharing CAD files for grading plans, decreasing the depth of the storm drain, early procurement, and the use of narrower dowels. Overall, the total documented savings from innovations was over $1 million.

Impact to Schedule

The following are some of the anticipated schedule savings due to innovations:

- Use of poly pipe instead of copper resulted in a more efficient phasing plan, saving a month or more.
- Sharing of CAD files for grading saved approximately 3-4 weeks.
- Switching from a single trunk line, instead of two lines on the storm drain saved at least 2 weeks.

Impact to Quality

Of the innovations that the contractor introduced, the use of concrete pavement instead of asphalt is the most prominent. Use of concrete pavement doubles the life expectancy and decreases the maintenance costs, resulting in the potential for millions of dollars in life-cycle cost savings.

Benefit to Public

The use of polyethylene pipe instead of copper on the water laterals will lessen the traffic impacts during construction. Because the pipe material is fusible, the laterals can be installed for half the road at a time, in coordination with the construction phasing. This method results in improved maintenance of traffic by maintaining traffic on the other side of the roadway, separate from the trenching operations.

Project Schedule

One of the main reasons why CMGC was attractive for this project was the prospect of compressing the construction schedule into one construction season. The plan was to accomplish this by initiating early utility work. However, this goal will not likely be accomplished due to unforeseen delays. The most prominent delay was the moratorium on all projects, issued by the Governor in November 2008, due to funding concerns. This moratorium set the project back nearly three months. In addition, storm drain and lighting redesign resulted in an additional 2-4 weeks of delays, and utility relocations and right-of-way acquisition have also

resulted in some delays. The Utility companies have not been as responsive to relocating their utilities as was anticipated. (Nathan Peterson interview)

Risk

Risks associated with underground utilities were reduced by having the contractor perform their own potholing. This allowed for the contractor to have a better understanding of the utilities. In addition, the contractor's potholing crew was able to pinpoint critical locations for utility conflicts, resulting in a design that better accommodated utilities, thus lowering risk (Nathan Peterson interview).

Learning Opportunities

Although Learning Opportunities were not listed as one of the reasons for pursuing CMGC on this project, there were still opportunities for UDOT to learn from the contractor, and vice-versa. The contractor gained a better understanding and appreciation of the design process. The Department was able to gain a better understanding of the right-of-way requirements that are needed during construction and the contractor's influence on utility coordination.

Environmental Stewardship

There were several opportunities for the contractor to coordinate and assist with lessening impacts to the environment. The following is a list of some of these opportunities:

- UDOT and the Contractor were able to coordinate to obtain environmental clearances for a site near the project to discard excavated material. This is the first time that the UDOT Environmental Division has cleared a waste site for a contractor. Without the use of this site, the Contractor would have had to transport material to a commercial site two hours away. CMGC allowed enough time for this coordination to take place before construction, resulting in reduced trucking miles and emissions.
- The Contractor was able to assist in the asbestos abatement of some of the abandoned buildings.
- Early Contractor involvement in the Storm Water Pollution Prevention Plan (SWPPP) resulted in a customized, more efficient plan.

Public Benefit

The feedback from the Designer was that CMGC increased the ownership and accountability of the contractor. This increased ownership was manifest in the relationships that were established early on between the Contractor and the public, including the staff at the impacted cities. In addition, the UDOT PM felt that having an early package item to remove abandoned

homes and begin clearing right-of-way helped to build momentum early for the project in the public's mind.

Procurement

The procurement process for the CMGC services is outlined below (from the project RFP).

Project Milestones

Key dates and milestones for the CMCG process are listed in Table 3.

TABLE 3 – Project Milestones

Stage	Date
Environnemental Document	February 2007
Begin Design	August 2007
CMGC RFP Advertised	July 2008
Contractor Selected	July 2008
Contractor Design Services NTP	September 2008
Construction NTP	June 2009

Selection of Committee Members

The Selection Committee was made up of UDOT staff from Region One and the UDOT central office. Representatives from ACEC, AGC, and FHWA were also on the committee.

Evaluation/Selection Criteria

The contractor was selected based on the following criteria which were scored individually as outlined below. The selection criterion are listed below:

- Project Team/Capability of the Contractor
- Project Approach
- Project Innovations
- Contractor Price Proposal
- Approach to Price Proposal

A section within the proposal response was dedicated to each of the criteria listed above.

Project Team/Capability of the Contractor

The Selection Team considered the qualifications and experience of the contractor's team on how it related to the specific project. Each voting member of the Selection Team ranked the candidates based on a point system. The maximum points available for this section were 15. The following qualifications were considered:

- Project Team members chart including design and construction personnel.
- Qualifications and experience of key personnel on the Project Team who will be committed to the design phase and the construction phase of this project.
- Lists of similar projects completed during the last five years.
- Description of methods, approaches, and innovations implemented, including risks taken, on previous projects that achieved success in relation to the project goals

Project Approach

Contractors were asked to supply the following information in their proposals in regards to their project approach:

- Project Phasing and Cost Model
- Subcontractor Plan
- Public Involvement
- Maintenance of Traffic
- Identification of Resources and Capabilities
- Coordination with Syracuse City and the Utility companies

The Selection Team evaluated each candidate's approach to the project based on UDOT's stated goals for the project. This evaluation was based on each candidate's approach to the project in meeting these goals, including any specific commitments made by their team that would assist in achieving the established goals. Commitments that were stated by the Contractor in the Technical Proposal, either during the design phase or the construction phase, were considered as proposed courses of action. Similarly the Selection Committee rated each candidate based on the criteria outlined. A maximum of 20 points were available for this section.

Project Innovations

Each candidate was invited to give innovative ideas that could increase the likelihood for success. The Selection Team then considered how well the innovative ideas helped to balance the goals of the project. Similarly, the Selection Committee rated each candidate based on the criteria outlined. A maximum of 15 points were available for this section. A discussion of each innovation proposed was required to address the following issues:

- A description of how the specific innovations to this project meet the stated goals of UDOT.
- An estimation of the amount of time and money saved if the innovation were to be implemented.
- Identifying which innovations meet the RFP requirements and which do not.

Contractor Price Proposal

The Selection Team evaluated each Contractor's Price Proposal (total amount bid). Price was rated on a modified curve. All price proposals were granted a maximum score of 35 if they were within one standard deviation below the average price. Points were deducted from the score for price proposals outside the standard deviation range as shown in Table 4.

TABLE 4- Deduction of Score Base on Bid Price

STDEV=Standard Deviation	Percent Reduction	Points Scored
3 STDEV below average	60%	14.0
2 STDEV below average	30%	24.5
1 STDEV below average	0%	35.0
Average	0%	35.0
1 STDEV above average	40%	21.0
3 STDEV above average	80%	7.0
3 STDEV above average	100%	0.0

Scores between the values listed in Table 4 were calculated using linear interpolation. Furthermore it was maintained that if the standard deviation is less than 5% of the average of all bids, the price would be dropped as a selection criterion. And if the standard deviation was between 5% and 10% of the average of all bids, the percent reduction would be reduced by half. The total points available for the price proposal were 35. Since only three candidates responded to the RFP, the engineer's estimate was included in the analysis as an independent bid.

Approach to Price Proposal

Candidates were scored by the Selection Team based on the Unit Prices submitted. Unit Prices for the bid items included in the Price Proposal were held by the Contractor for their Final Bid Amount. The sum of the price components equaled the total Unit Price Bid. Unit Prices reflected the approach and commitments proposed by the Contractor as described in the Project Approach identified above. Each candidate included a baseline "indexed" cost for raw materials. The purpose of this was to allow for changes (increase or decrease) in unit prices based on future changes in raw materials. A maximum of 15 points were available for this section. Each candidate was asked to provide a response concerning impacts to the unit price for the following issues:

- Schedule – Delays or Early RFP
- Daytime versus nighttime work
- Segmenting the work
- Traffic control shifts and phasing

- Substantial Changes in Quantities – what % increase / decrease would affect unit price

Selection Results

Each of the candidates were scored and ranked on the selection criteria discussed previously. Based on the selection criteria, Geneva Rock was deemed the most suitable team for this project.

Analysis of Performance

This section discusses both the schedule and the cost performance of this project.

Schedule

Figure 4 shows the project timeline.

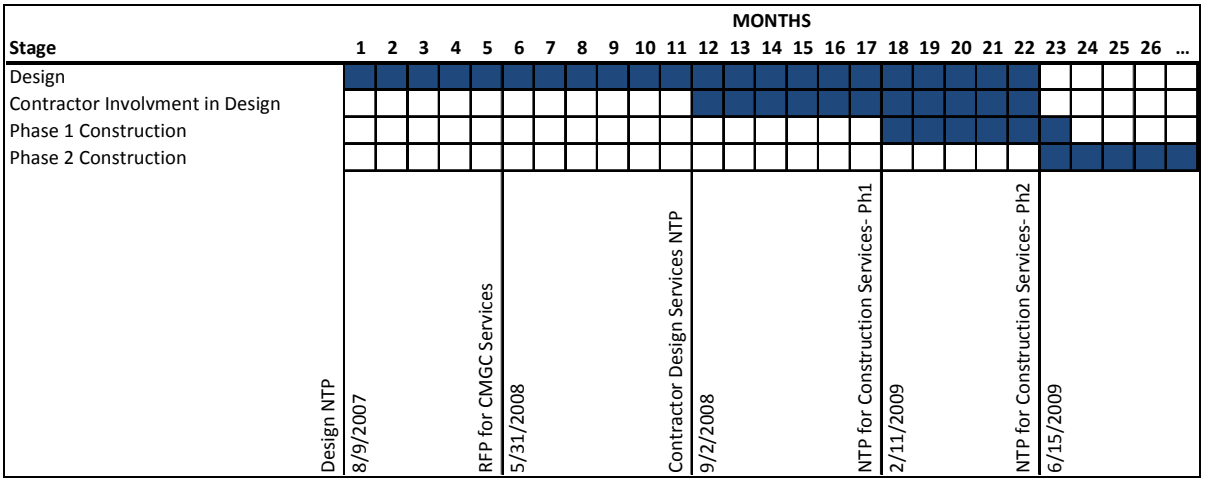

Figure 4 - Project Timeline

UDOT made the decision to move from a traditional process to CMGC at approximately 30 percent design. At that point, the design team temporarily slowed the pace of some of the design activities during the CMGC contractor procurement process so that the contractor would be able to contribute meaningfully to the design.

In September 2008, the contractor was given the Notice to Proceed (NTP) with design support services. The project team worked collaboratively towards the goal of preparing the design so that construction could be completed during the 2009 construction season. Due to factors both internal and external to the project, this goal will not be met. There was a three month delay in late 2008/early 2009 due to statewide funding concerns, which was the main factor for not meeting the 2009 completion goal. In addition, right-of-way clearances, storm drain redesign,

last minute municipal betterment requests, and delays from the power company all contributed to project delays.

However, the use of CMGC allowed for an early procurement phase, in which the contractor began work on the irrigation water line, secondary water line, and demolished abandoned homes left behind from right-of -way takes. This early phase built momentum for the project and resulted in increased public and political support.

Cost Comparison

This section compares the bids for both the main construction and the early bid items. In both cases, the proposed bid presented by the contractor was compared with the Engineer's Estimate prepared by the Designer and an Independent Cost Estimate (Stanton Constructability Services). This "bid opening" was in accordance with UDOT's standard procedure. The entire bid breakdown and the ICE are included in the Appendix of this report.

Early Bid Items

Table 5 shows a comparison of the bid for the early construction work, which included utility work and demolition of abandoned homes.

TABLE 5 COST COMPARISONS OF BIDs for Early Construction Items

	Engineer's Estimate	ICE	Bid
Cost	$1,780,786	$4,006,210	$1,915,066
Percent Diff. of Eng. Est.		+124.98	+7.54
Percent Diff. of ICE			-52.20

The bid was within ten percent of the engineer's estimate, and was considerably lower than the ICE. In comparing individual items, the largest discrepancies between the contractor and the ICE were in the mobilization and traffic control, both of which were lump-sum items. In addition, the ICE overestimated the cost of the waterline installation by underestimating waterline production rates.

Table 6 shows a comparison of bids for the main portion of the project construction.

TABLE 6 COST COMPARISONS OF BIDs for Final Construction

	Engineer's Estimate	ICE	Bid
Cost	$11,200,993.75	$15,738,846.10	$12,032,465.45
Percent Diff. of Eng. Est.		+40.51	+7.42
Percent Diff. of ICE			-23.55

As shown in Table 6, the ICE was approximately 40 percent higher than the bid. To better understand the discrepancy between the contractor bid and the ICE, a comparison of the subtotals for major project components was made. Table 7 shows this comparison. The majority of the price discrepancy was in the roadway component.

TABLE 7 – Final Bid Price vs. Independent Cost Estimate

Project Component	ICE Price	Contractor Price	Percent Difference
Roadway	$14,246,950.65	$10,708,999.60	-24.8%
Structures	$27,760.00	$30,600.00	+10.2%
Landscaping	$394,111.20	$315,460.60	-20.0%
Signing	$199,989.25	$151,445.25	-24.3%
Signals	$193,900.00	207,500.00	+7.0%
Lighting	$252,940.00	$271,700.00	+7.4%
ATMS	$147,500.00	$157,900.00	+7.1%
Culinary Water Line	$220,915.00	$143,860.00	-34.9%
Secondary Water Line	$54,780.00	$45,000.00	-17.9%
Total	**$15,738,846.10**	**$12,032,465.45**	**-23.5%**

The following are some specific bid items where the ICE was particularly high as compared to the Contractor:

- Mobilization: -977,500.00, -43.5%
- Traffic Control: -609,000.00, -40.9%
- Survey: -139,300.00, -56.6%
- Roadway Excavation: -251,300.00, -29.4%
- 18 inch Concrete Pipe: -118,681.20, -45.1%
- PCC Pavement, 10 inch: -801,190.00, -17.6%
- Concrete Retaining Curb: -56,362.40, -77.4%
- Strip, Stockpile, Spread Topsoil: -85,217.30, -79.8%

Mobilization, traffic control, and survey combine to make up a cost discrepancy of over $1.7 million. All three of these items were lump sum, making them more difficult to compare, and more difficult for the ICE to bid.

Because the initial bid came in lower than the independent cost estimate, UDOT awarded the construction contract based on this bid. On existing and upcoming CMGC projects, UDOT is placing a greater emphasis on ICE involvement in the measurement and payment (M&P) meetings to ensure that the ICE thoroughly understands all of the contractor's assumptions

going into the bid. However, price is not discussed at these meetings, to ensure that the bid from the ICE is independent.

Lessons Learned

The following are some of the lessons learned from up through the start of construction for this project, based on feedback during interviews:

- Get the contractor involved early- the earlier the better (Nathan Peterson, UDOT).
- Before the bid, decide as a group on the sub consultants (such as landscaping and electrical), and then let the ICE and the contractor share that information. This should lead to more accurate bids from the ICE (Shane Albrecht, Geneva Rock).
- CMGC is not necessarily a schedule booster, at least during design (Nathan Peterson, UDOT).
- Get the contractor very involved in the reviews. Maybe implement a contractor sign-off on the plan sheets to encourage contractor buy-in (Nathan Peterson, UDOT).
- The ICE and the contractor need to communicate and make sure that they're bidding on the same project (Nathan Peterson, UDOT).
- This process has helped the designers realize the importance of looking into utility conflicts more as a designer and to put more effort into avoiding them (Doug Grahm, Ryan Richins, Horrocks).
- It was useful to see the contractor's perspective to the approach and phasing (Doug Grahm, Ryan Richins, Horrocks).
- Make sure the schedule enough time in design to incorporate the contractor's ideas (Doug Grahm, Ryan Richins, Horrocks).
- CMGC helps with tail-end delivery more so than speeding up the front end of a project (Doug Grahm, Ryan Richins, Horrocks).

Conclusion

Use of CMGC has resulted in various benefits for this project, including a higher quality pavement, cost-saving innovations, reduction in risk on utilities and right-of-way, and constructability enhancements. Due to extenuating circumstances, the potential schedule benefits of CMGC may not be fully realized. Based on the feedback from interviews, CMGC was a useful tool in contributing to the success of this project.

APPENDIX- Interview Notes

CMGC Interview Questions

UDOT Project Manager- Nathan Peterson

Project Description: Syracuse Road widening and reconstruction

Pin: 4896

Project Phase: Phase 1

Design

What benefits did you see in design because of contractor participation?	• After reviewing and pricing different pavement scenarios, Geneva Rock proposed utilizing concrete pavement which reduced cost and simplified construction and resulted in a longer service life (Shane Albrecht). • It was helpful to discuss options with the contractor regarding easement sizes and ROW constraints (Nathan Peterson). • Utilities such as Qwest gave the contractor more credibility and were willing to work around design issues, resulting in more cost effective solutions relating to utilities (N Peterson, R Richins, S Albrecht). • The contractor helped with the storm drain layout, pothole information, and project phasing (Nathan Peterson). • The pricing information provided by the contractor was useful in determining between design alternatives (D Grahm, R Richins). • The contractor's continuous input on constructability issues allowed for customizing the design to match the contractor's methods (D Grahm, R Richins). • The collaborative environment between the designer and engineer resulted in the ability to be more responsive, as demonstrated in the ability to quickly redesign the storm drain at the last minute before the bid (Shane Albrecht) • Phase 1 helped the contractor to be more familiar with the soil conditions and traffic to give a better bid for phase 2 (Nathan Peterson). • The early phase rebuilt momentum for a project that had stalled out because the public could see that UDOT was making physical progress on the project (Nathan Peterson).

Describe the nature and value of contractors' design suggestions?	• Constructability reviews by GR provided savings and will keep one lane clear for traffic throughout project. Water and storm lines were installed using polyethylene pipe (which is cheaper than copper) allowing contractor to install to mid section and cap for connection later (Shane Albrecht). • The team decided to use one single larger storm drain to reduce the number of conflicts with other utilities. However, larger pipe affected the Fiber Optic Qwest line. GR met with Qwest and found that they may be able to excavate enough fiber optic cable to "hump" line over new enlarged storm pipe (Shane Albrecht). • The contractor's input on constructability addressed a wide variety of issues from general to very specific (Nathan Peterson). • The contractor recommended a shallower depth on the storm drain pipe, lowering the unit cost of installation (D Grahm, R Richins). • The contractor's reviews were helpful on all levels of the job, including pavement type, landscaping, review of profile, park strip details, utility relocations, and lighting (D Grahm, R Richins).
How did you evaluate and decide which suggestions to use?	• Decisions were generally made through group discussion. If the recommendation resulted in a cost savings or betterment, it was generally accepted and incorporated (Shane Albrecht, D Grahm, R Richins). • During regular design reviews comparisons were given via their costs model to validate decisions (Shane Albrecht). • On minor decisions, they were often decided between the designer and contractor, but UDOT was kept in the loop. On major decisions, UDOT was involved. For example, on the decision to move from HMA to PCC, the PM, RMT, RE, and district engineer all weighed in on the decision (Nathan Peterson).
What Challenges came up during design and did you resolve them?	• ROW acquisition took a little longer than expected (Shane Albrecht). • There were some instances where GR's input early on would have reduced the ROW negotiations- it would have helped to get GR involved earlier (Shane Albrecht).

	• Utility conflicts- potholing helped considerably in planning around utilities, and helped reduce risk with bid estimate (Shane Albrecht, D Grahm, R Richins). • "Dry" utilities- GR helped push the utility companies early to get involved (Shane Albrecht). • The storm drain was a challenge. It was originally dual trunk, but changed to single as a result of team collaboration (Nathan Peterson). • Issues arose concerning sewer laterals, the detention basin, and access issues. Contractor input and feedback was helpful for all these (Nathan Peterson).
What is the cost savings anticipated and or produced by contractor's suggestions?	• $750,000 in savings with pavement design (Shane Albrecht). • $125,000 for water laterals (Shane Albrecht). • $240,000 in savings for finding a dump site for excess dirt near the project (Shane Albrecht). • In some cases, such as decreasing the depth of the storm drain, the cost savings were so obvious, that the comparative savings weren't calculated (D Grahm, R Richins).
How did the contractor communicate cost changes that corresponded with design changes?	• GR brought prices along with suggestions to the meetings (Shane Albrecht). • Sometimes the designer asked for feedback on cost from GR. For example: they wanted a cost estimate for doing full-depth concrete vs. rotomill with 4-inch overlay at the intersection at the eastern terminus of the project. The team decided to go with a full depth concrete which increased the cost by about 30% but life expectancy was 3 times longer (Shane Albrecht). • The contractor tracked changes with their associated costs on a spreadsheet, and submitted bi-weekly reports, which was also helpful in communications with FHWA and others (Nathan Peterson). • The contractor communicated cost savings at bi-weekly meetings and by email (D Grahm, R Richins).
Was there any work besides design that was required of the contractor prior to	• The contractor performed potholing to assist in more accurate design (D Grahm, R Richins).

construction?	

Constructability

How was constructability improved by involvement of the contractor in design?	• Solidification of the phasing plan to build the south side of the roadway first. This lessened the impact to traffic and likely reduced cost due to streamlined construction (Shane Albrecht). • Moved the storm drain system a couple of feet to the south, which will hopefully avoid conflicts with the water line. Should avoid up to 10 loops in the 16" water line (Shane Albrecht). • GR brought to the team's attention that with the original phasing of building the south side first, they wouldn't be able to use the existing road surface as base course, because it would be used as a driving surface during construction. This oversight became a non-issue by going with the concrete pavement (Shane Albrecht). • The contractor helped with easements and ROW, such as understanding the extent of construction impacts, and plans for working around trees and decorative landscaping in homeowner's yards (Nathan Peterson). • The contractor took a detailed look at phasing to minimize temporary paving and minimize traffic delays, including maintenance of traffic plans (D Grahm, R Richins). • The contractor was able to make recommendations regarding utility coordination and relocations that will make construction more efficient (D Grahm, R Richins).
What constructability issues identified by the contractor were included in design?	• Nearly every serious suggestion was included in design (Shane Albrecht, Nathan Peterson).

Innovations

What innovations were used to reduce cost?	• The use of fusible poly pipe on the laterals (Shane Albrecht).

	• Early procurement of 1 inch dowels for pavement. UDOT decided after this procurement had occurred that the pavement depth should be increased from 8 inch to 10 inch, resulting in the need to upgrade to 1 ¼ inch dowels. GR agreed to do a 10 inch pavement for the price of 8 inch, if UDOT would allow for a design exception of 1 inch dowels. UDOT agreed to design standard change (Shane Albrecht). • Switching to concrete pavement (Nathan Peterson, D Grahm, R Richins).
What innovations were used to reduce schedule?	• Using a single trunk line instead of dual on the storm drain shortened the schedule by a few weeks (Nathan Peterson). • Using collarless manhole covers would likely save 3-4 weeks, but the Department ultimately didn't allow it (D Grahm, R Richins).
What innovations were used to improve quality?	• The switch to PCC pavement (Shane Albrecht, Nathan Peterson).
What technology innovations were used?	• Sharing of electronic files from the designer to the contractor for use in the 3D grading design saved time and money (Shane Albrecht). • Flexible poly pipe instead of copper on water laterals (Nathan Peterson).
What innovations were used to reduce impacts to the public?	• Innovative surface treatment on concrete for a quieter ride (Shane Albrecht, Nathan Peterson). • By utilizing polyethylene pipe allowed for the ability to phase the installation of the water laterals, allowed the public to utilize an undisturbed driving surface. Reconnection of water lines with the phasing of the lane closures was facilitated (Shane Albrecht). • They are performing night work to reduce traffic impacts (D Grahm, R Richins).

Project Schedule

How much time was saved in design?	• Early coordination with Rocky Mountain Power saved time. UDOT was willing to bid before RMP was done with utility relocations because of the coordination GR had done with them. GR provided data on schedule impacts and

	mitigation plan to share risks with the State about utility delays (Shane Albrecht). • CMGC didn't save any time in design (Nathan Peterson, D Grahm, R Richins).
How much cost was saved in design?	• CMGC didn't save cost in design, but there should be savings in construction (Nathan Peterson, D Grahm, R Richins).

Risk

How did the team identify, evaluate, and track project risk?	• GR created a risk matrix focusing on probability, impact, and cost of risks to prioritize risks for team, with 30-40 risks identified early on (Shane Albrecht). • The GR risk matrix was useful because it included both probability and severity (D Grahm, R Richins). • The risk evaluation helped to weed out and prioritize between perceived versus actual risk. Some risks that were originally perceived to be a major concern turned out to be a lower priority once they were analyzed objectively (Shane Albrecht). • Early procurement of rebar was a risk that GR took on (Shane Albrecht). • The contractor kept a running list of risks, the team held separate risk meetings (Nathan Peterson). • UDOT kept some of the risks, such as soft spots in the road base (Nathan Peterson). • Risks that were likely to be encountered were included in the design through the M&P (R Richins, S Albrecht). • Even the public involvement consultant provided some valuable inputs on risk (Shane Albrecht).
Which contractor suggestions helped you to reduce risk and control cost?	• Switch from asphalt to concrete pavement. Cement prices have been less volatile than asphalt (Shane Albrecht, D Grahm, R Richins). • The contractor helped with increasing the precision on drawing easement lines and ROW takes (Nathan Peterson). • Refinement of construction schedule- it helped to be able to gear specifications to the schedule (Nathan Peterson). • Working with the contractor allowed the designers to refine

	the M&P notes, making them clearer, particularly on lump sum and specialty items. This reduced the risk of misunderstandings, and allowed the contractor to cut risk out of the bid (D Grahm, R Richins). • The utility coordination has reduced risk (D Grahm, R Richins).

Environmental Stewardship

How did bringing the contractor on early alleviate environmental concerns?	• GR coordinated with UDOT to get the environmental clearances for a site near the project to dump excess dirt, rather than having to dump at a commercial site 2 hours away. This was the City's preference. This move reduced trucking miles and emissions. **This was the first time that UDOT environmental has cleared a waste site for a contractor** (S Albrecht, N Peterson). • Helpful in the abatement of some of the abandoned buildings (Nathan Peterson, D Grahm, R Richins). • Their input on tree relocations may have helped to save some mature trees (D Grahm, R Richins). • They gave early input on the SWPPP. Their input resulted in the use of a non-standard plan that wouldn't have been used otherwise (D Grahm, R Richins).

Benefits to Public

How did the public benefit from the CM/GC process?	• Geneva Rock's recommendations will result in improved traffic control, quieter pavement, cost savings, and longer service life of pavement section (Shane Albrecht). • Having an early package item to knock down abandoned homes and begin clearing ROW helped to build momentum early for the project in the public's mind (Nathan Peterson). • It was helpful to have an early source of contact for the City and the locals to start building a relationship with the contractor (Nathan Peterson). • CMGC has increased the accountability and ownership by the contractor. It was good to get them involved early in the public involvement (D Grahm, R Richins).

	• The cost savings in the pavement design are saving taxpayer dollars (D Grahm, R Richins).

Lessons Learned

What did you learn in the CM/GC process?	• The third-party construction management consultant has been frustrating to deal with. Would prefer either UDOT employees, or let the contractor have a say in the construction management firm selection. Consultant REs should be used for DBB, not CMGC. In CMGC, they haven't been a part of the collaboration in design (Shane Albrecht). • Before the bid, decide as a group on the subs (such as landscaping and electrical), and then let the ICE and the contractor share that information. This should lead to more accurate bids from the ICE (Shane Albrecht). • Get the contractor involved early- the earlier the better (Nathan Peterson). • CMGC is not necessarily a schedule booster, at least during design (Nathan Peterson). • Get the contractor very involved in the reviews. Maybe implement a contractor sign-off on the plan sheets to encourage contractor buy-in (Nathan Peterson). • The ICE and the contractor need to communicate and make sure that they're "bidding on the same project" (Nathan Peterson). • This process has helped the designers realize the importance of looking into utility conflicts more as a designer and to put more effort into avoiding them (D Grahm, R Richins). • It was useful to see the contractor's perspective to the approach and phasing (D Grahm, R Richins). • Make sure the schedule enough time in design to incorporate the contractor's ideas (D Grahm, R Richins). • CMGC helps with tail end delivery more so than speeding up the front end of a project (D Grahm, R Richins). • The schedule didn't flow as well as hoped. The clearance of the utilities and ROW and also the governor's moratorium all combined to slow things down. Also, one last ROW

	agreement held up the advertising and delivery of the final plans. The contractor could have probably gotten underway without being delayed by the last ROW agreement (D Grahm, R Richins). • It would be helpful to have the CMGC process better defined and more consistent (Nathan Peterson). • With the Central UDOT team performing all of the ROW duties, it limits the ability of the contractor to assist (Nathan Peterson). • The ICE overlooked some issues. It would be helpful to have more than one ICE consultant. Also, there should be a better defined process that encourages more ICE participation while still avoiding collusion (Nathan Peterson). • There was a hope that the contractor would have had more pull in getting the big utilities to move more quickly on their relocations. In particular, Rocky Mountain Power, Qwest, Questar, and the UP railroad have been challenging to deal with. Apparently they move slowly no matter who they're dealing with (Nathan Peterson, Shane Albrecht). • It would be helpful to set up a process where PMs can pull in contractors for advice and review on an on-call basis on non CMGC projects (Nathan Peterson). • The following are locations where CMGC is useful: urban reconstruction, complicated design, numerous utilities, and other high risk projects (Nathan Peterson).
Was there anything you would change during the RFP portion of the project?	• It was generally a pretty straight-forward process (Shane Albrecht). • Give the bidders more detail in the RFP about interviews and the weight they carry (Nathan Peterson). • Consider taking price out of it. The contractors don't know the job well enough to price it well, and also entire items can change, as shown in the switch from asphalt to concrete pavement. Also, it may be unfair to expect the same prices a year later (D Grahm, R Richins).
Would you have used different selection criteria?	• Should have put more emphasis on price on this particular project (Nathan Peterson). • Emphasize innovations and ideas that will save cost (D Grahm, R Richins).

	• Consider including market advantages, such as proximity of the project to the contractor's gravel pit as part of the criteria. Perhaps this could be included in the innovations section (Nathan Peterson).
Would you change the way you selected based on price?	• Potentially, but still feel that "we made the right choice" (Nathan Peterson). • We should emphasize and clarify profit, overhead, and change orders (Nathan Peterson). • If you're going to leave price in, the pricing criteria is great (D Grahm, R Richins). • Maybe give a lower weight to the approach to price. That section was tough to evaluate. It would be worth taking a good look at the criteria used in this section and reevaluating what criteria are used (D Grahm, R Richins).
What changes would you have made in the way you developed the RFP?	• It was fine (Nathan Peterson). • It was a pretty rigorous process. It would be good to have it standardized some day (D Grahm, R Richins).
What changes would you make in the selection process?	• Consider making interviews mandatory and well defined. It is important to see that the superintendants are able to communicate (Nathan Peterson). • Let contractors know that they can call the PM with questions (Nathan Peterson). • You almost need to require the interview. The interview is good to get a sense of their motivation to do the work, and their understanding of the project (D Grahm, R Richins).
How would you improve the RFP development?	• It was fine (Nathan Peterson). • Have an AGC representative review the RFP. It may add a week or two to the due date, but it could add value (D Grahm, R Richins).

General Notes/Other Items

Did you set a committed advertising date and	• Yes, and it was met (Nathan Peterson). • The original date wasn't met due to the moratorium, but it would have been met (D Grahm, R Richins).

did you meet your schedule?	
Describe negotiation problems and their resolution.	• GR didn't receive the Federal rate requirements prior to the bid, and the contract completion dates had changed, resulting in changes to unit prices. The discrepancies created some concerns at FHWA, resulting in a delay for the reward (Shane Albrecht). • There were some frustrations regarding the schedule. The schedule expectations placed on the contractor weren't adjusted to account for the Governor's 3 month moratorium on projects. There were some conflicts, particularly with the resident engineer in phase 1, but a softer end date for phase 2 was negotiated (Shane Albrecht). • In general, negotiations went well (Nathan Peterson). • There were some technical issues that needed to be worked through related to different accounting systems. Contractors aren't set up for hourly billing (design) activities (Nathan Peterson). • The contractor wanted to reduce the concrete pavement thickness penalties, but UDOT wouldn't allow it (D Grahm, R Richins). • We would have liked to see more involvement by UDOT and the designer in the selection of subs (D Grahm, R Richins).
How would you rate the CMGC process prior to the beginning of the project?	• GR engineer came in not knowing what to expect, and felt a lot of pressure to provide value. Will feel more comfortable going forward (Shane Albrecht). • Contractors aren't generally set up for hourly billing. This was a bit of an adjustment. GR proposed lump sum billing by task, instead of hourly billing (Shane Albrecht). • Rating of 7 or 8 out of 10. It would help to document the process, and have a more formal process. The biggest discrepancies between the different CMGC projects are with dealing with the ICE man and sharing of information between the engineer, contractor, and the ICE (Nathan Peterson). • In an urban setting with the accompanying complexities,

	CMGC should be the method of choice (Nathan Peterson). • Rating or 8.5 out of 10. The contractor supplied great input, particularly in understanding the costing and approach on lump sum items. However, it's hard to tell if the contractor came in with the cheapest price. It may have been cheaper using DBB (D Grahm, R Richins).